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R. Bruce Scott
Commissioner

MAY 21 2010

STATE PLANNING AND ENVIRONMENTAL ASSESSMENT REPORT (SPEAR)

Regional Facilities Plan

City of Barbourville, Knox County, Kentucky
AI 2534; PLN20090001

The City of Barbourville has submitted for approval by the Energy and Environment Cabinet (EEC) a regional facility plan titled "*Regional Facilities Plan Update for the Barbourville utilities Commission*" dated August 2009. In accordance with KRS Chapter 224 and 401 KAR 5:006, the Department for Environmental Protection (DEP) has prepared a State Planning and Environmental Assessment Report (SPEAR) that summarizes the regional facility plan.

The DEP is required to conduct reviews of the potential environmental impacts of projects applying for funding by the Clean Water State Revolving Fund in accordance with the procedures contained in the State Revolving Fund Operating Agreement between the Environmental Protection Agency Region IV and the Commonwealth of Kentucky. The DEP has included this required review in the attached SPEAR. The DEP has determined that the projects in the SPEAR will not have a significant effect on the environment when all mitigative measures in Section F of the SPEAR are implemented.

The SPEAR contains information supporting this determination in the following sections: A) Project Summary; B) Existing Environment; C) Existing Wastewater Facilities; D) Need for Project; E) Alternatives Analysis; F) Environmental Consequences, Mitigative Measures; G) Public Participation and User Rates; and H) Sources Consulted.

Interested persons are encouraged to submit comments on this SPEAR within 40 days of the above date. The EEC will take no action on this project until after the State Clearinghouse review and public comment period has ended, and will evaluate all comments before a decision is made to proceed with approval of the Regional Facilities Plan or awarding of SRF funds for this project. Send comments to Ms. Anshu Singh, Supervisor, Wastewater Planning Section, Water Infrastructure Branch, Division of Water, 200 Fair Oaks 4th Floor, Frankfort, Kentucky 40601, or by e-mail to anshu.singh@ky.gov, or call her at (502) 564-3410, extension 4805.

Sincerely,

R. Bruce Scott, Commissioner
Department for Environmental Protection

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STATE PLANNING AND ENVIRONMENTAL ASSESMENT REPORT (SPEAR)

City of Barbourville, Knox County, Kentucky

AI#2534; PLN20090001

MAY 21 2010

A. Project Summary and Funding Status

Project Summary: The city of Barbourville owns and operates a wastewater treatment plant (WWTP) and collection system. The WWTP is aging and operating near 90% of its design capacity and the collection system has excessive infiltration and inflow (I/I). The City submitted a **Wastewater Facilities Plan Update** in September, 2009, in which it has proposed plans to expand the WWTP capacity, reduce inflow and infiltration (I/I), and extend the collection system to un-sewered portions of the planning area to meet its 20 year wastewater needs. The twenty year planning period is divided into three phases (Figure 3).

Phase I (0-2 years): During this phase the existing WWTP will be expanded to 1.5 mgd at an estimated cost of \$3,910,000. Additionally, approximately 48,000 linear feet (LF) of sewer line will be inspected and rehabilitated to address I&I (Figure 3) at an estimated cost of \$2,279,000. Some pump stations will also be upgraded at an estimated cost of \$896,000. The total estimated cost of phase I project is \$7,715,990.

Phase II (3-10 years): During this phase the WWTP will be expanded from 1.5 to 2 mgd at an estimated cost of \$4,312,500. In addition, 100,000 LF of sewer lines will be inspected and rehabilitated at an estimated cost of \$6,420,000. The remaining pump stations will also be upgraded at an estimated cost of \$749,000. During this phase sewer services will also be extended to the area of Artemus by constructing 31,000 LF of gravity sewer, 22,000 LF of force main and seven lift stations (Figure 4). The total estimated cost of extending sewer service is \$5,773,100. The total estimated cost of phase II project is \$18,091,100.

Phase III (11-20 years): This phase involves extending sewer service to unserved areas and to areas currently served by failing septic systems in the rural sections of the planning area (Figure 4). This will involve construction of 100,000 LF of gravity sewer and force main. Two package treatment plants namely, Girdler Elementary School Package Plant and Jackson MSC in Grey will be eliminated. The total estimated project cost is \$11,472,291.

The engineering firm that prepared the facilities plan is Vaughn & Melton Consulting Engineers, Inc. The project is located in the Cumberland Valley Area Development District and within the area covered by the London Regional Office of the Division of Water (DOW).

Funding Status: The City plans to fund the project from the United States Department of Agriculture (Rural Community Development Grant). The Utility has two million dollars that they will allocate to this project. Total estimated cost of projects in phase I is \$7,715,990.

B. Existing Environment

Topography: The southern planning area boundary extends to the southern floodplain of the Cumberland River. The remaining boundaries parallel watershed divisions as closely as possible. Land elevations within the planning area fluctuate widely due to the rugged terrain. The medium

elevation of the planning area is 1,200 feet above mean sea level (amsl), several mountain formation exceeding 1,600 feet (amsl) are present. Land elevations between 980 to 1100 feet (amsl) are associated with river floodplain. The floodplain, averaging 1,600 feet in width at Barbourville, rises 25 feet above the river channel, creating some rough local terrain, but providing some protection against the flood waters of the river.

Geology: The Barbourville planning area is contained in the physiographic region entitled the Eastern Coal Field. The Eastern Coal Field, encompassing 28 eastern Kentucky counties, is further divided into three topographic regions. The Cumberland Plateau, a broad and gently rolling upland, consists of a belt 5-30 miles wide along the western edge of the province. The Cumberland Mountain section lies to the southeast, and sections two parallel mountain ridges. The Kanawha Section comprises the remainder of the Eastern Coal Field. This section, containing the planning area, consists of a plateau region, intensely dissected by river drainages systems. Two main formations, the Breathitt and the Lee, occur within the Eastern Coal Field. The Lee formation, the earliest in region, has been exposed by weathering processes and dominates most of the Cumberland Plateau section. There is some exposure of this formation in the Kanawha section, but virtually none within the planning area. An exposure area near Flat Lick has been characterized by Kilbourn, et.al. as being of the Lee formation, but more recent reports suggest the region to be of high-level fluvial deposition. The remainder of the planning area is characterized by the Breathitt formation and alluvium. The existing rock formation and flood prone areas within the planning area make construction of sewer infrastructure challenging.

Soils: The Whitley-Stendahl soil association and Latham-Shelocta association are the two soil associations found within the planning area. The Whitley-Stendahl soil association is alluvial in nature and contains many minor soil groups. It is characterized by gently sloping, deep, well drained soils on ridgetops and side slopes, and nearly level, deep, somewhat poorly drained soils on floodplains. These soils are formed in residual or alluvial material from sandstone, siltstone, shale or combinations of all three. The Latham-Shelocta association is common to the hilly and mountainous regions. It consists of steep, deep, well drained, very stony soils on rough mountainsides. These soils are formed in material from acid sandstone, siltstone, shale, or combinations of all three. Stones and boulders are common, especially along steep drainage ways. In some areas they may cover as much as 10 percent of the surface. These soils have been rated as somewhat limited to very limited for septic tank absorption fields and sewage lagoons.

Surface Water: The planning area is located primarily within the Upper Cumberland Basin Management Unit; however the northern portion of the planning area is within the Kentucky River Basin Management Unit. The planning area spans several watersheds including the Richland Creek, Goose Creek, Stinking Creek, Cumberland River above Stinking Creek, Cumberland River above Meadow Creek and Big Indian Creek. The planning area is drained by the Cumberland River, Stinking Creek, Richland Creek, Fighting Creek, and several unnamed tributaries. Some of the surface waters within the watershed have been assessed for designated use(s), but not all designated uses have been assessed. The designated uses of surface water for the planning area that have been assessed and fully support their designated use are detailed in Table 1.

Table 1. Assessed Waterbodies Supporting Designated Use(s) (source: 2008 Integrated Report)

Waterbody & Segment	Fully Supported Designated Use(s)
Richland Creek (0.0 to 6.3)	Primary Contact Recreation
Richland Creek (11.6 to 21.5)	Warm Water Aquatic Habitat
Turkey Creek (0.0 to 1.2)	Warm Water Aquatic Habitat

Impaired segments of assessed waterbodies are detailed in Table 2.

Table 2. Assessed Waterbodies not Supporting Designated Use(s) (source: 2008 Integrated Report)

Waterbody & Segment	Impaired Use Assessment	Causes	Sources
Middle Fork of Richland Creek (0 to 1.2)	Partial Support Warm Water Aquatic Habitat TMDL is required	Sedimentation/Siltation	Highways, Roads, Bridges, Infrastructure (New Construction); Site Clearance (Land Development or Redevelopment); Surface Mining
Richland Creek (0.0 to 6.3)	Non-support Warm Water Aquatic Habitat; TMDL is required	Nutrient/Eutrophication Biological Indicators; Sedimentation/Siltation; Iron; Dissolved Oxygen Saturation	Coal Mining, Legacy coal extraction, Urban Runoff/Storm Sewers
Stinking Creek (0.0 to 2.10)	Non-support Warm Water Aquatic Habitat; Primary Contact Recreation Water; Secondary Contact Recreation Water	Oil and Grease; pH; Sedimentation/Siltation	Channelization; Impacts from Abandoned Mine Lands (Inclusive); None Irrigation Crop Production; Petroleum/natural Gas Activities; Petroleum/natural Gas Production Activities (Permitted); Source Unknown; surface mining
Stinking Creek (11.3 to 12.4)	Partial Support Warm Water Aquatic Habitat	Sedimentation/Siltation; Sulfates	Coal Mining; Loss of Riparian Habitat; Wildlife other than Waterfowl; Woodlot Site Clearance

There is one Source Water Assessment and Protection (SWAP) area- Barbourville Water and Electric in the planning area. Turkey Creek is designated as Outstanding State Resource Water.

Barbourville Utility Commission and Knox County Utility Commission are the water providers serving the planning area.

Groundwater: Groundwater is the major water supply for rural customers in the planning area. Most wells in valley bottoms produce enough water for a domestic supply. Fewer than half the wells drilled on hillsides are adequate for a domestic supply. Most of the water from drilled wells is extremely hard and contains noticeable amounts of iron. According to Kentucky Division of Water, the planning area has moderate sensitivity to groundwater pollution due to primary porosities in the alluvium and secondary porosity in the rock formations from stress relief and coal mining activities

C. Existing Wastewater Facilities

Wastewater Treatment Plants: Barbourville Utility Commission operates a 1 mgd WWTP that discharges to Cumberland River at mile point 632.8 pursuant to Kentucky Pollutant Discharge Elimination (KPDES) Permit No. KY0024082. The WWTP was constructed in 1975-76 and consists of secondary treatment unit operations. The major components include an influent pump station, four partially mixed aerated lagoons, a secondary circular clarifier, disinfection facilities, and sludge storage basin. The sludge is disposed at an approved sludge disposal site located adjacent to the WWTP site. The average flow, as reported for the period from March 2009 to February 2010, was 0.86 mgd, and the average peak flow was 0.95 mgd.

Monthly average effluent limits that must be met by the existing WWTP plant are as follows:

Parameter	Limits
BOD ₅	30 mg/l
Total Suspended Solids	30 mg/l
Ammonia Nitrogen	20 mg/l
Dissolved Oxygen	Not less than 2 mg/l
Total Residual Chlorine	0.011 mg/l
Fecal Coliform	200 colonies/100 ml

Collection System: The city of Barbourville is served by a conventional gravity sewer system and some of it is more than 50 years old. The collection system consists of 150,000 LF gravity sewers, 50,000 LF of force mains, and 24 pump stations. Several of the pumps and associated equipment have reached their design life expectancy and need to be replaced/upgraded. The collection system has excessive infiltration/inflow. The utility is in the process of identifying the significant I/I sources by performing TV inspection and smoke testing. The utility has plans to perform inspection and rehabilitation work on approximately 10% of the system every two years until the entire system is mapped and evaluated.

Package Treatment Plants: Three package treatment plants are located within the planning area. Two of the package plants serve schools namely Girdler Elementary School and Flat Lick School. The third package plant is privately owned and is located on US 25 E in Grey and is owned by Jackson MSC. It is an aerated lagoon system that discharges to Middle Fork of Richland Creek at mile point 3.3 pursuant to KPDES Permit No. KY0063746. There are no known problems with these plants.

D. Need for Project

The WWTP is aged and operating at 86% capacity and the collection system has excessive I/I. The population in the planning areas is expected to increase from 3580 in 2009 to 4059 in 2029. In addition, there are about 30 straight pipes and 200 failing septic systems in the planning area that are polluting the water resources. Therefore, to meet the current and future needs, and improve the water quality of the local streams it is necessary to expand the WWTP and upgrade the collection system as well as extend sewer services to unserved areas.

E. Alternatives Analysis

Wastewater Treatment Alternatives:

Alternative No. 1 - No Action Alternative: This alternative involves no initial construction and no action other than maintaining and operating the existing facilities. The plant is currently operating at 86% capacity and will not be able to meet the future needs. In addition, the existing plant is over 34 years old and has outlived its useful life. The "No Action" alternative could result in the eventual degradation of surface water in the planning area and a ban on development would be initiated and other possible actions by the DOW for possible KPDES permit violations. As a result, the no-action alternative was eliminated from further consideration

Alternative No. 2 – Addition of a Membrane Filtration Reactor: This alternative will use two-stage biological treatment process and utilize the existing aerated lagoons. The second stage biological step will use membrane filtration to remove additional biological mass and filter suspended solids from effluent. The secondary clarifier will be re-used as a sludge thickener. In addition, a new mechanical fine screen, new headworks structure, new influent and effluent flumes, new UV disinfection system, post aeration basin and a return sludge pump station will be installed. The total project cost for this alternative estimated to be \$10,000,000. This alternative was not selected as it was not cost effective.

Alternative No. 3–Upgrade and Reuse Existing Biological Cells and Infrastructure: This alternative will utilize the existing biological cells. During phase I the capacity will be expanded to 1.5mgd and a new influent flow-meter will be installed along with a new bioaugmentation bacteria feed system. Upgrades to the existing lagoons will be made to include the addition of new diffused aeration tubing, new interior baffles in the lagoons, an effluent aerated rock filter to aid in removal of additional ammonia-nitrogen, new internal recycle pumps, a new blower, a new secondary clarifier, new effluent structure to serve as dechlorination chamber and post-aeration basin, new effluent pumps, upgrades to the chlorination/dechlorination equipment, a new sludge pump station, a new standby generator and other support facilities. During phase II the capacity will be increased to 2 mgd. A new headworks structure will be constructed with a new influent flume, new mechanical screen, new solids compactor, two new earthen basins lined with HDPE liner will be constructed to provide additional biological treatment capacity, and a new UV disinfection system will be installed.

The proposed WWTP expansion must be designed to produce the following monthly average effluent limits:

Parameter	Limits
BOD ₅	25 mg/l
Total Suspended Solids	30 mg/l
Ammonia Nitrogen	7 mg/l (summer)/ 10 mg/l (winter)
Dissolved Oxygen	7 mg/l
<i>E. coli</i>	130 colonies/100 ml
Total Residual Chlorine	0.011 mg/l
Total Phosphorus	Monitor
Total Nitrogen	Monitor

The total project cost for this alternative is estimated to be \$8,222,500 with a 20 year present worth of \$10,678,825. **This is the selected alternative because it provides an economically feasible and environmentally sound option for meeting the long term needs of the city.**

Collection System Alternatives:

Alternative No. 1 – No Action: This alternative involves no expansion or modification to the existing collection system which means future developments will be served using on-site systems. But since most of the soils within the planning area are not conducive to on-site system disposal, the new on-site systems are likely to fail and cause further degradation of surface and groundwater.

Alternative No. 2 – Expansion of the Existing Wastewater Collection System: This alternative involves construction of approximately 100,000 linear feet of gravity lines and 60,000 linear feet of new force mains to serve unserved portions of the Bimble and Heidrick areas, Artemus, Girdler, Swan Pond, and Gray. The package treatment plants in the Girdler and Gray areas will also be eliminated. The total cost of extending sewers to these areas is estimated to be \$17,245,391. In addition, the entire collection system will be evaluated and rehabilitated. The estimated cost for rehabbing the system is \$8,699,000. Pump stations will be inspected and upgraded. The estimated cost of upgrading the pump stations is \$1,645,000. **This is the selected alternative as it is the most cost effective and meets the future needs.**

F. Environmental Consequences, Mitigative Measures

Impacts on Historic Properties and Archeological Sites:

The Kentucky Heritage Council (KHC) stated in its August 27, 2009, letter that new sewer lines within the existing right-of-way, or renovations of the existing plant in previously disturbed areas do not require an archaeological survey. However, new sewer lines and new pump stations, force mains, retention basins not within the existing right-of-way must be surveyed by a professional archaeologist to determine if sites eligible for listing in the National Register of Historic Places will be affected by the undertaking. Previous agricultural plowing does not preclude the need for an archaeological survey. Where a given project area or portions thereof have been disturbed by prior construction, documentation of that disturbance may be filed with the State Historic Preservation Officer and a request may be made for an opinion concerning the need of an archaeological survey. A report documenting the results of this investigation must be submitted for review, comment, and approval by the Director of the Kentucky Heritage Council prior to construction.

Impacts on Threatened and Endangered Species:

The U.S. Fish and Wildlife Service (USFWS) stated in a letter dated August 10, 2009 (FWS # 2009-B-0955) that there is a potential for the endangered Indiana bat (*Myotis sodalis*) habitat and threatened blackside dace (*Phoxinus cumberlandensis*) to occur within the project vicinity.

To avoid potential impact to the Indiana bat population, the USFWS recommended;

1. Conducting a survey of the project area for potentially suitable winter habitat (caves, rock shelters, abandoned underground mines) and agreeing to remove trees in the project area only between October 15 and March 31 in order to avoid impacting Indiana bat; or
2. Conducting a biological survey of the project area to determine the presence or absence of the species within the project area, with coordination with USFWS on the survey plan and results; or

3. Providing USFWS with site-specific information that showed the there is no potentially suitable habitat within the project area or that the species would not be present in thin area due to site-specific factors; or
4. If the project schedule requires the clearing of potential Indiana bat habitat during the period of April 1 to October 14, then either the project site should be surveyed or a Conservation Memorandum of Agreement (MOA) should be signed with the USFWS.

To avoid potential impact to the blackside dace, the USFWS recommended:

1. Maintaining a buffer zone between the project areas, including construction activity, and the Cumberland River, Little Richland Creek, and any subject unnamed tributaries.
2. Utilize directional boring for each portion of the line that will span a tributary.
3. Construction activities should take place in late summer/fall during low flows.
4. Sediment Basin Management Practices (BMPs) should be utilized and maintained for BMP implementation. A plan for BMP should be submitted to USFWS for approval.

The Kentucky Department of Fish and Wildlife Resources (KDFWR) stated in a letter dated December 11, 2009, that the Kentucky Fish and Wildlife Information System indicates that state/federal threatened and endangered species are known to occur within close proximity of the proposed project area. However, KDFWR does not anticipate impacts to listed species due to location and nature of the project.

Impacts on Wetland and Streams:

The Kentucky Department of Fish and Wildlife Resources (KDFWR) in a letter dated December 11, 2009, recommended that erosion control measures should be developed and utilized during any construction to minimize siltation into nearby waterways. Such erosion measures may include, but are not limited to silt fences, staked straw bales, brush barriers, sediment basins, and diversion ditches. Erosion control measures will need to be installed prior to construction and should be inspected and repaired regularly as needed.

The U.S. Army Corps of Engineers (USACE),

The USACE, Nashville District, in a letter (Reference No. 09-63) dated August 26, 2009, indicated that the proposed activity would not likely impact waters of the United States and they have no objections to the project. However, if later on it is determined that any streams or wetlands would be impacted by the project required permits should be obtained.

Impacts on Floodplains:

A floodplain construction permit or an exemption will be required from the DOW's Surface Permits Branch, Floodplain Management Section, if there are any disturbances in the 100-year floodplain.

Impacts on Air Quality:

Kentucky Division for Air Quality Regulation 401 KAR 63:010 Fugitive Emissions states that no person shall cause, suffer, or allow any material to be handled, processed, transported, or stored without taking reasonable precaution to prevent particulate matter from becoming airborne. Additional requirements include the covering of open bodied trucks, operating outside the work area transporting materials likely to become airborne, and that no one shall allow earth or other material being transported by truck or earth moving equipment to be deposited onto a paved street or roadway. Please note the Fugitive Emissions Fact Sheet located at http://www.air.ky.gov/homepage_repository/e-Clearinghouse.htm

Kentucky Division for Air Quality Regulation 401 KAR 63:005 states that open burning is prohibited. Open Burning is defined as the burning of any matter in such a manner that the products of combustion resulting from the burning are emitted directly into the outdoor atmosphere without passing through a stack or chimney. However, open burning may be utilized for the expressed purposes listed on the Open Burning Fact Sheet located at http://www.air.ky.gov/homepage_repository/e-Clearinghouse.htm

Impacts on Forests:

Currently, there is no state forest property that will be impacted by the construction, but there are two state champion trees that will be impacted by any construction planned for the area. The state champion umbrella magnolia and trilobum red maple are located in the area and reside on private property. Take care around existing trees that will be remaining after construction is completed and consider planting back native trees that will keep the scenic vistas beautiful and healthy.

Miscellaneous Impacts:

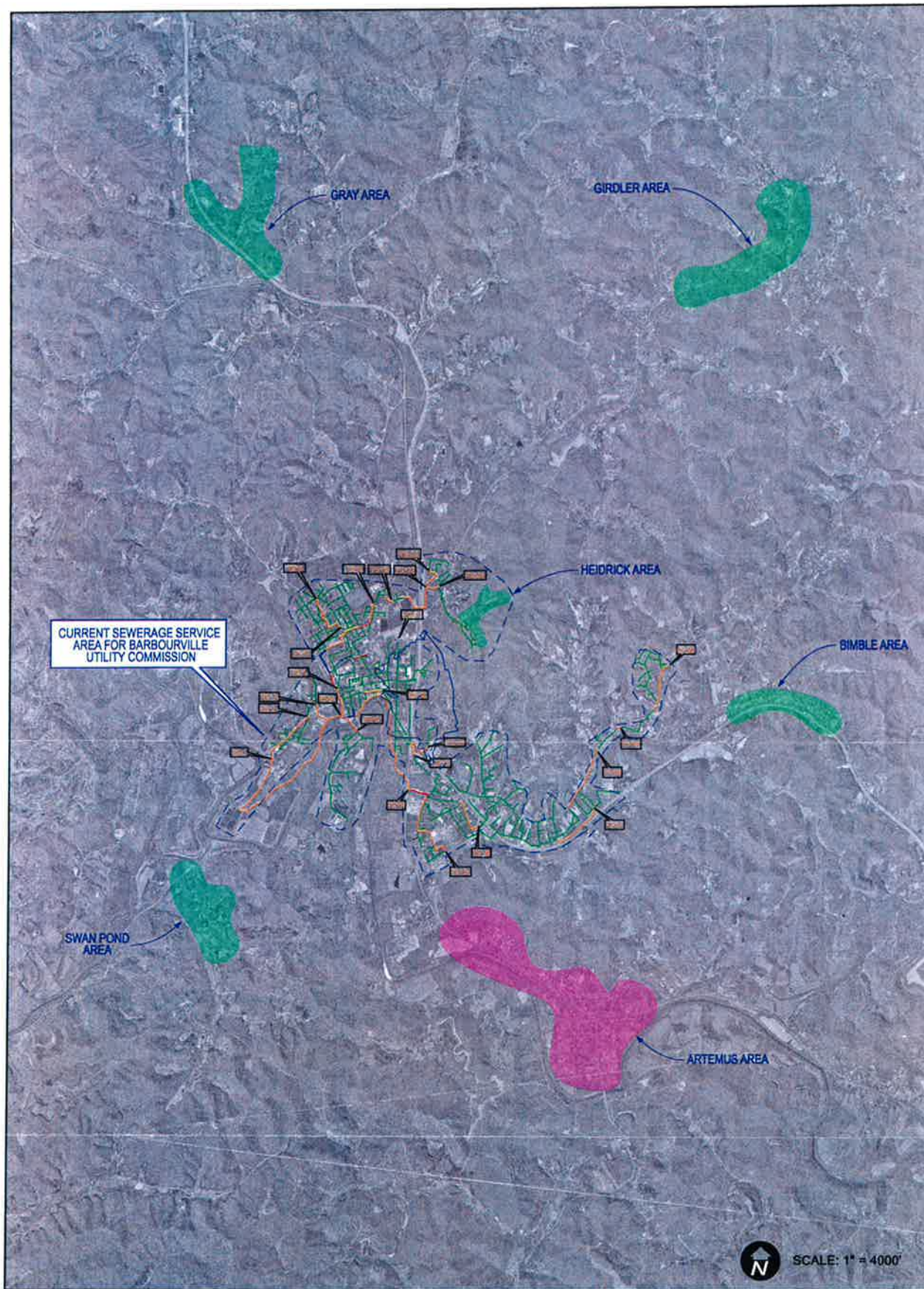
The environmental impact of constructing the proposed facilities includes those temporary impacts of noise, dust, and traffic disruption in the construction area. The proposed project will improve the surface water and groundwater quality over the next 20 years. This action will also provide a planned development for economic growth in the planning area.

G. Public Participation and User Rates

A public hearing was held on August 25, 2009, at the Barbourville City Hall. This meeting was advertised in the Barbourville Mountain Advocate on August 6, 2009. The Division of Water is unaware of any unresolved significant public objection, which may have been voiced before or after this meeting, in relation to this project. The current sewer rates for the customers inside the city limits is \$13.60 per 4000 gallons per month and \$19.90 for 4000 gallons per month for customers outside the city limits. The proposed monthly rates are estimated to increase by \$7 per 4000 gallons per month.

H. Sources Consulted

Kentucky Department for Public Health
Kentucky Department of Fish & Wildlife Resources
Kentucky Division for Air Quality
Kentucky Division of Forestry
Kentucky Division of Waste Management
Kentucky Division of Water
Kentucky Heritage Council
Kentucky State Clearinghouse
Natural Resources Conservation Service Web Soil Survey
U.S. Fish & Wildlife Service
City of Barbourville
Vaughn & Melton Consulting engineer
Judge-Executive, Knox County
Cumberland Valley Area Development District



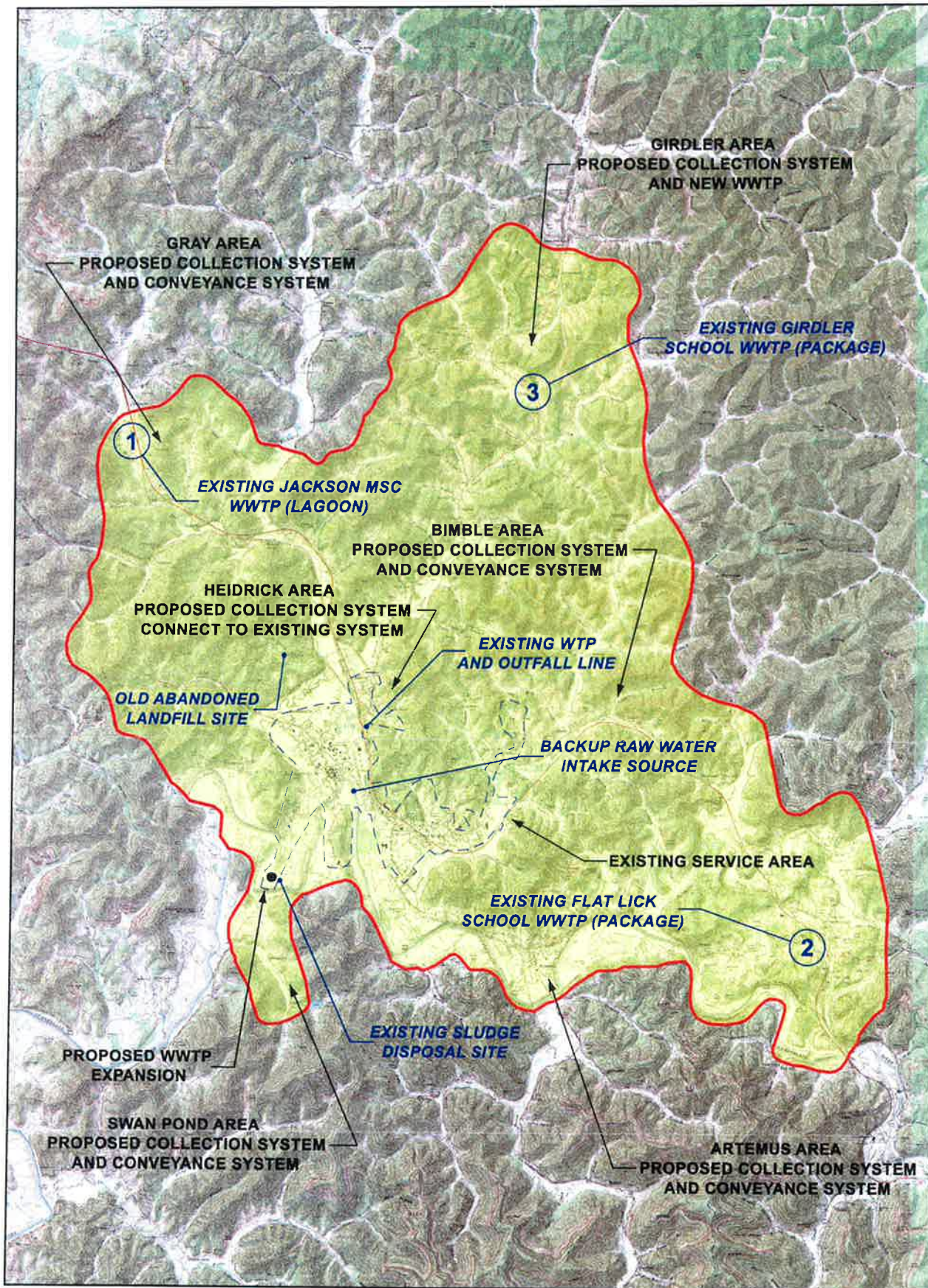
PROJECTED SEWERAGE SERVICE AREAS - BARBOURVILLE FACILITIES PLAN UPDATE (2009)

KNOX COUNTY, KENTUCKY

FIGURE 3



Vaughan & Melton
Consulting Engineers, Inc.
109 S. 24th Street
Middlesboro, Kentucky 40965
(606) 248-6600
www.vaughanmelton.com



Vaughn & Melton
Consulting Engineers, Inc.
109 S. 24th Street
Middlesboro, Kentucky 40965
(606) 248-6600
www.vaughnmelton.com

SCALE: 1" = 6000'



PLANNING AREA
BOUNDARIES



Project Number: 10552-02
Date: June, 2009

PROPOSED INFRASTRUCTURE - BARBOURVILLE FACILITIES PLAN UPDATE (2009)

KNOX COUNTY, KENTUCKY

FIGURE 4